B.C.Hydro

Electric and Gas Load Forecasts

1985/86 - 1995/96

Low-Probable-High

Prepared by
Load Forecast Department
Marketing Group

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1.0 SUMMARY

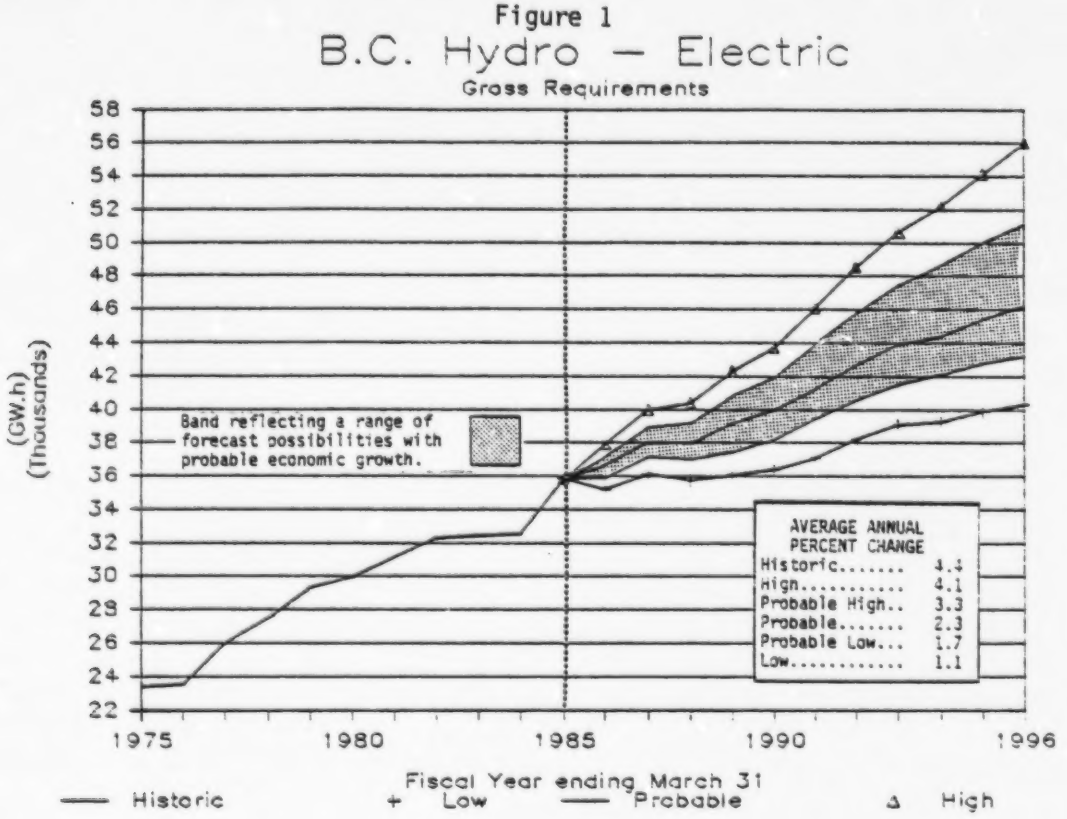
This document presents B. C. Hydro's forecasts of electric and natural gas sales and resulting gross requirements to 1995/96. The forecast document is prepared annually as a basis for fixed asset expenditure planning, natural gas contract nominations and financial planning. Updates are issued whenever significant changes occur which affect the outlook for sales.

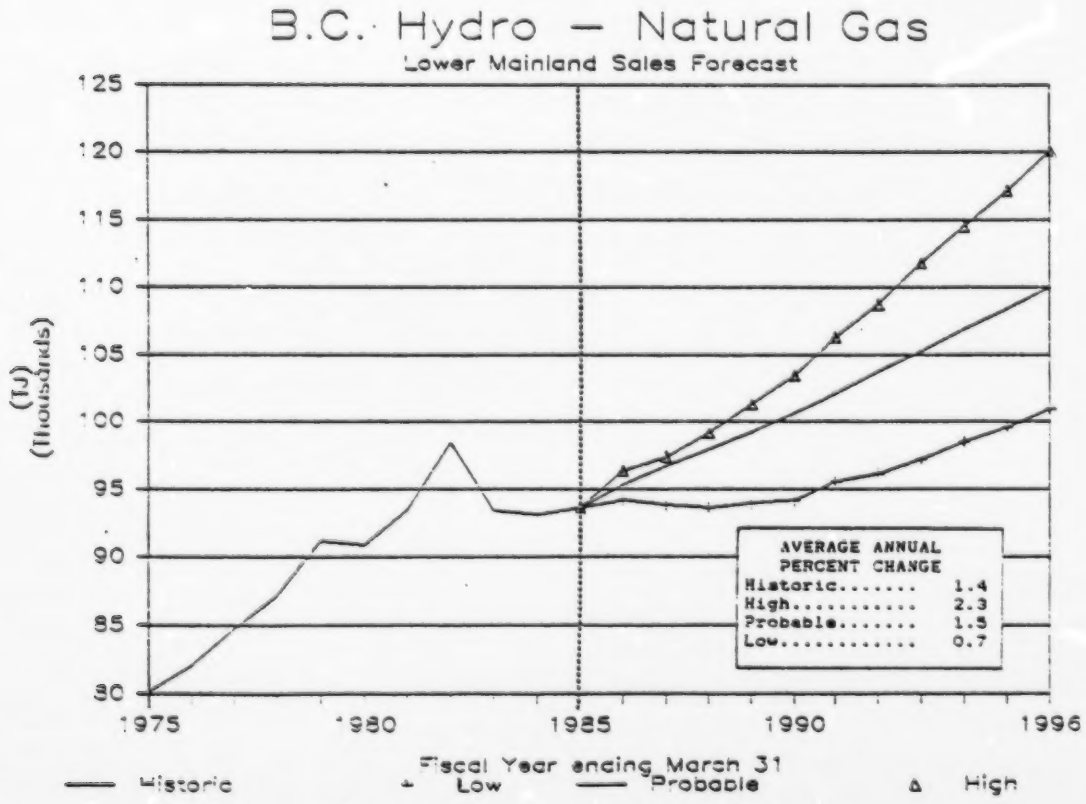
The past year saw a sharp increase in sales to all customer categories of 9.6% growth in total, including domestic marketing programs. An update was issued in May to reflect this higher level of activity and to revise the revenue budget for 1985/86.

We do not, however, foresee the growth of the past year continuing into this year or affecting the long term sales outlook. A number of special circumstances including colder than normal weather and a rebound from the Pulp and Paper shutdown contributed to the spurt in growth.

The comparison of this year's probable electricity and gas forecasts to the year 1995/96 with the probable forecasts prepared in July 1984 for the same period is tabulated below along with the underlying economic growth and population forecast assumptions.

Figure 1


B.C. Hydro — Electric
Gross Requirements
(GW.h) (Thousands)
58
56
54
52
50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
1975
1980
1985
1990
1996
Band reflecting a range of forecast possibilities with probable economic growth.
AVERAGE ANNUAL PERCENT CHANGE
Historic..... 4.4
High..... 4.1
Probable High.. 3.3
Probable..... 2.3
Probable Low... 1.7
Low..... 1.1
Fiscal Year ending March 31
Historic
Low
Probable
High


B.C. Hydro — Natural Gas
Lower Mainland Sales Forecast
(TJ) (Thousands)
125
120
115
110
105
100
95
90
85
80
1975
1980
1985
1990
1996
AVERAGE ANNUAL PERCENT CHANGE
Historic..... 1.4
High..... 2.3
Probable..... 1.5
Low..... 0.7
Fiscal Year ending March 31
Historic
Low
Probable
High

B. C. HYDRO

COMPARISON OF JULY 1985 AND JULY 1984
PROBABLE FORECASTS TO YEAR 1995/96

	July 1985	July 1984
Economic Assumptions		
B. C. Gross Domestic Product Growth rate (%/year), 1984 to 1995	2.5	2.8
Population Growth Rate (%/year), 1984 to 1995	1.5	1.8
Electric Service		
Gross Requirements 1995/96 (GW.h)	46 240	46 500
Average Annual Growth Rate 1984/85 to 1995/96 (%/year)	2.3	2.4
Gas Service		
Total Sales 1995/96 (TJ)	110 038	110 352
Average Annual Growth Rate 1984/85 to 1995/96 (%/yr)	1.5	1.5

1.1 Economic Assumptions

The B. C. Economy is forecast to average 2.5% real annual growth over the period to 1995. Swings above and below this rate will inevitably occur such as during 1986 when Expo is expected to have a positive effect on growth followed by a slowdown in 1987. Beyond that little can be said about future cycles. Each of the last few years has seen a lowering of expectations for growth for B. C. and this year is no exception. However, the adjustment from 2.8% down to 2.5% is much smaller than last year's. The population forecast has been factored downward significantly as a result of continuing high unemployment projections and lower rates of in-migration.

1.2 Electric Service Forecast

The forecasts of electric requirements presented in Figure 1 include:

- low, probable and high electric forecasts based on a range of economic growth forecasts of ±1%/year around the probable forecast.

- a band around the probable electric forecast which reflects the uncertainty inherent in the forecast within the probable economic outlook due to impacts such as energy intensive industries proceeding or not proceeding, and the effects of the domestic marketing programs.

The probable electric energy requirements are forecast to increase at an average annual growth rate of 2.3% from 35 842 GW.h in 1984/85 to 46 240 GW.h in 1995/96. The forecast assumes that natural gas will be available on Vancouver Island in 1987/88.

The differences in this year's forecast compared to last year's are mainly on the components of growth rather than a significant change in outlook for the end of the period:

- residential sales forecast is lower due to lower population growth forecast;

- commercial sales forecast is higher due to higher use per account and expectation of higher growth in this sector;

- West Kootenay Power and Light requirements have not been included as a firm load; and

- an allowance for domestic marketing programs in this year's forecast.

Although the July 1984 forecast growth rate was 3.0% average per year and the July 1985 is only 2.3% average per year the July 1985 forecast actually projects sales for 1995/96 that are almost identical. This is due to the higher starting year value.

1.3 Gas Service Forecast

The probable natural gas requirements are forecast to increase at an average annual growth rate of 1.5%, unchanged from last year with total forecast requirements in 1995/96 being virtually identical between the two forecasts.

2.0 BASIS OF FORECASTS

This section describes briefly the major assumptions underlying the sales forecasts: economic growth outlook, population forecast, commercial and industrial sectoral outlooks and energy price trends.

2.1 Economic Growth

The outlook for provincial economic growth was prepared on a straight forward concensus basis this year in contrast to the more elaborate techniques of previous years which included the simulation of national and provincial macroeconomic models. B. C. Hydro has changed its approach to economic forecasting from one of developing in-house expertise to one of utilizing external expertise, including that of the Provincial Government. The reasons for this are several. First, many of the macroeconomic forecasting techniques are primarily applicable to the short run outlook. The long run economic outlook which is most pertinent to a ten year electric and gas sales projection is best forecast through an examination of a few fundamental trends. Second, accuracy in short run economic forecasting does not readily translate into accuracy in energy demand forecasting. While long run trends in GDP and electricity and gas consumption change quite slowly, they can fluctuate widely in the short run. The July 1984 forecast called short run GDP quite accurately (final figures are not available, but the forecast of 2% growth appears to be close to the actual) but the first year (1984/85) of the electricity and gas forecast was considerably below actual growth. The reason lies partly in the fact that production levels in sawmills and pulp and paper mills were high but prices were low, thus the forest sector's dollar contribution to GDP was relatively low while electricity consumption was relatively high.

Another, and perhaps more fundamental reason, for changing the approach this year is the mounting evidence that increased sophistication does not yield improved forecasts. Measured strictly on the basis of forecast accuracy naive models tend to do as well as elaborate models. (However, elaborate models are necessary to perform sensitivity and policy impact analyses.)

B. C. Hydro's forecast of long run GDP growth is for an average annual increase of 2.5 percent. There will of course be fluctuations around this trend with some years showing better, others poorer, performance. However, this estimate provides the best basis for long run electricity and gas sales forecasting.

2.2 Population Forecast

This year the population forecast was prepared utilizing the Small Area Population model of the Ministry of Industry and Small Business. Careful consideration was given to interprovincial and international migration patterns. This projection along with fertility and mortality rates were fed into the model to produce an age specific population forecast for B. C. and for the B. C. Hydro service area. Adjustments were made to the output at a regional level to ensure that growth was consistent with the level of activity seen by our Districts in the short term, and with our industrial perspective in the long term.

While net provincial migration into B. C. has averaged 32 000 annually over the last ten years it is forecast to average only 24 000 annually to 1995. This is indicative of the continued high level of unemployment and the relatively low level of economic activity that is projected. Not until the end of the forecast period do we see in-migration again rising to the historic level of 32 000 people annually.

The population for B. C. is forecast to rise from 2 871 000 in 1984 at an average annual rate of 1.5% to 3 344 000 in 1995. This is significantly lower than last year's projected 1.8% average annual increase with a 1995 estimate of 3 489 000.

The impact of the lower population forecast upon residential energy sales will be pronounced. The momentum of an aging population combined with low in-migration will have the effect of altering the mix of housing types and energy use patterns towards smaller dwellings and lower consumption. For example the over-65 share of the population is expected to increase from 11.6% in 1984 to 13.7% in 1995.

2.3 Sectoral Outlooks

The main sectoral divisions are between commercial (service producing) and industrial (goods producing). The commercial sector is expected to outpace growth in the industrial sector throughout the period. This reflects a less than optimistic outlook for forestry and mining which are the main components of the industrial sector and optimism for certain of the commercial sectors.

Among the commercial sectors, tourism and business and personal services should achieve the highest growth rates with B. C.'s continuing development of relations with the Pacific Rim countries.

Within the industrial sectors, forestry and mining will remain as the main drivers of the economy; however, growth will be considerably slower than in the 1960's and 1970's. Slower growth in world raw material requirements, increased foreign competition, poor prices (and hence poor financial status of many companies) and lack of substantial new or economical raw material will all limit future expansion in the forest and mining sectors.

In metal mining, copper and molybdenum prices are not expected to increase to where any substantial new development will occur in B. C.. Reopening of some presently closed mines and some moderate expansion, with firming prices expected in the late 1980's will be offset by closures, due to ore depletion of other mines. The age and energy costs for much of the existing world copper smelting capacity indicate B. C. could well support a copper smelter in the 1990's and one is thus projected for the mid 1990's.

The production of metallurgical coal is expected to remain relatively flat over the period. The Japanese steel industry is the major market and no growth is seen in that industry. Considerable excess metallurgical coal capacity presently exists in B. C. and elsewhere in the world. Some moderate expansion of thermal coal production is expected from small, high quality new mines with ready access to transportation facilities.

The pulp and paper industry while presently operating at fairly good levels is not getting high enough prices to support significant expansion or modernization. Expansion and new facilities are not expected to occur until the late 1980's and continue into the 1990's. The need to increase productivity and better utilize raw materials which are becoming limited, will result in new pulping technologies (e.g. chemi-thermo-mechanical pulping or CTMP) being used and more value-added products being produced (e.g. fine papers, tissue, writing and printing papers, paperboard).

The wood manufacturing industry is facing many hurdles: poor prices, protectionism within the U.S., lack of and declining quality of available raw material, and outdated operations, particularly on the Coast. For this forecast it is assumed no significant protection legislation will be enacted in the U.S.. Very limited expansion is expected to occur but a trend to higher value-added products is projected.

The natural gas industry is expected to provide some stimulus to the economy. As well as a pipeline to V.I. other projected projects are a Liquified Natural Gas (LNG) facility at Grassy Point and an ammonia plant at Kitimat.

Other major industries in B. C. are expected to show minimal change in the period. No new aluminum capacity is expected before the mid 1990's. The chemical industry associated with the chemical pulp and paper industry will not add significant new capacity. One or more of the refineries located in the Lower Mainland are expected to close as they are small and relatively inefficient by present industry standards, and there currently exists an excess of refining capacity in Western Canada.

2.4 Energy Prices

B. C. Hydro's future rates for electricity depend on revenue requirements which in turn depend on both the costs for existing plant and the costs for additional plant needed to meet load growth as well as other factors such as taxes, export revenues, the cost of servicing U.S. dollar denominated debt and so on. While it is difficult to predict precisely what level rates will be, it is possible to identify the trend by using B. C. Hydro's Corporate Financial Model with reasonable assumptions for key financial and other parameters. The results indicate that electricty prices in the future will be held steady in nominal terms and will fall somewhat in inflation - adjusted terms.

Oil prices are forecast to continue to fall in real terms throughout the rest of the decade barring any unforeseen supply disruptions. Tightening of supply in the 1990's will tend to push oil prices up in real terms.

Natural gas pricing policy is in a state of uncertainty at the present time. With the move to deregulation it is increasingly unlikely that natural gas will be priced according to a fixed formula in relation to oil prices. Natural gas prices in B. C. are, however, expected to increase in real terms and thus move somewhat closer in heating value equivalent prices to oil and electricity.

The effect of this outlook for energy prices on the forecast is included in two ways:

1. Conservation factors were identified in the residential and commercial electric sectors to reflect lower real electricity prices.

2. The outlook for energy intensive industry under Bill 28 or through normal investment decisions is enhanced by lower electricity prices and the forecast reflects that.

The change in natural gas prices and the scope for changes in end use was handled in a similar fashion to last year's forecast. The outlook for relative prices of electricity, gas and oil has not changed sufficiently to warrant changing conversion rates or penetration rates for new housing stock and appliances.

ELECTRIC FORECASTS

3.0 ELECTRIC FORECASTS

3.1 Basis of Forecast

The population, economic and energy price forecasts and sectoral information described in the previous section are translated into electricity requirements using a "top down/end use" approach to forecasting. The top down aspect of the approach entails the use of the population and economic forecasts and sectoral outlooks to project the household formation, commercial activity and industrial production that generate the need for electricity. The end use focus consists of analysis of how various customers presently use electricity and how consumption patterns are likely to change in the future.

The effects of energy price changes are examined by first establishing the scope customers have for changing electricity use by measures such as: installing more efficient appliances and higher levels of insulation, choosing an alternative source of energy for heating, switching to more efficient lighting, substituting other energy sources or modifying the way electricity is used in existing industrial processes, changing industrial processes, or self-generating electricity rather than purchasing.

3.2 Probable Forecasts

The principal components of the July 1985 Probable Load Forecast to 1995/96 are summarized in Table 6.

Table 6

B. C. HYDRO ELECTRIC SALES - 1995/96

Category[1]	Actual 1984/85 Sales (GW.h)	Increase in Sales 1984/85 to 1995/96 (GW.h)	1995/96 Sales (GW.h)	Average Annual Growth Rate 1984/85 to 1995/96 (%/yr)
Residential	9 577	1 841	11 418	1.6
Commercial	7 970	2 738	10 708	2.7
Industrial	13 667	4 455	18 122	2.6
Other[2]	267	98	365	2.9
Total Res, Comm, Ind & Other	31 481	9 132	40 613	2.3
Seattle City Light	-	318	318	-
Total Billed Sales	31 481	9 450	40 931	2.4
Losses & Accruals	4 361	-	5 309	-
Total Gross Requirements	35 842	-	46 240	2.4

[1] The industrial and commercial categories do not correspond to B. C. Hydro's Rate categories. A breakdown of the above industrial and commercial sales into B. C. Hydro Rate categories is presented in Tables 11, 12 and 13.

[2] Inter-utility transfers (including WKP&L actual) and firm export.

The forecast growth rate in Residential sales of 1.6% per annum is less than a third the rate experienced over the past ten years. This relatively low growth rate, which is well below that forecast in 1984 of 2.3%, reflects a slower projected growth in population and household formation than last year and than over the past decade. Use per household is expected to remain essentially constant at the normalized 1984/85 level. Although households will tend to have more appliances and a larger percentage of households will use electric heat, these potential increases in use are offset by improved appliance efficiencies, higher levels of insulation and a trend towards apartments and row houses.

Commercial sales are also forecast to grow considerably slower than the historical rate but somewhat higher than was forecast in 1984. The lower growth rate (than historical) is primarily due to moderate growth in commercial activity combined with lower unit electricity requirements in new buildings and gradual retrofitting of existing buildings with more efficient equipment. Compared to last year, this forecast assumes somewhat less conservation based on marginally declining real electricity prices.

Almost half of the 9 450 GW.h increase in total billed sales expected between 1984/85 and 1995/96 are for industrial customers. This represents a growth rate of 2.6% per year which is above the overall average growth rate. Table 7 presents a breakdown of the Industrial sales increase to 1995/96 by type of industry. All sales projections for the Domestic Marketing programs are assumed to be in the industrial areas and are included in Table 7. Refer to Tables 13 and 14 for further details.

Table 7

B. C. HYDRO ELECTRIC SALES - INDUSTRIAL - 1995/96

Category	Actual 1984/85 Sales (GW.h)	Increase in Sales 1984/85 to 1995/96 (GW.h)	1995/96 Sales (GW.h)	Average Annual Growth Rate 1984/85 to 1995/96 (%/yr)
Paper & Allied Product Manufacturing	5 849	1 382	7 231	1.9
Wood Manufacturing	1 751	249	2 000	1.2
Chemical and Chemical Products Manufacturing	1 330	552	1 882	3.2
Metal Mines	2 204	430	2 634	1.6
Mineral Fuels	632	253	885	3.1
Construction	148	36	184	2.0
Other (including unspecified)	1 753	1 553	3 306	5.9
Total	13 667	4 455	18 122	2.6

The additional requirements of the paper and allied product sector account for 31% of the total increase in Industrial sales. The assessment of the resource base and market trends for this sector identified Thermo-Mechanical Pulping (TMP) and Chemi-Thermo-Mechanical Pulping (CTMP) as the processes best suited to utilize and upgrade British Columbia's remaining wood resource base. Whereas chemical pulp generally utilizes less than 50% of the wood fibre and requires both heat and mechanical energy, TMP and CTMP utilize over 90% and 80% respectively of the wood fibre and require mostly mechanical energy for grinding. The absence of wood wastes to fuel self-generation and the greater need for mechanical energy result in purchased electric energy requirements per tonne of TMP and CTMP being about five times those for chemical pulp and thus the apparent high growth in electricity requirements compared to the moderate growth in production expected.

The forecast of projects to come on line by 1995 shows one expansion of market CTMP, one new greenfield CTMP/fine paper mill, three replacements of stone groundwood with TMP/CTMP, and two additions at existing mills of CTMP/paperboard.

The wood manufacturing sector is projected to show only modest growth as harvesting approaches the allowable annual cut. Some expansion is projected, in particular certain panel products, but this is offset in part by decreases in veneer and plywood production. An allowance of 100 GW.h is also included for anticipated new electric wood drying facilities.

The output of the present chemical industry in B. C. is closely linked to the pulp and paper industry it serves. Although the growing CTMP industry will require some chemicals, the quantities used will only be a small fraction of those used by the existing kraft mills. Growth is thus limited to some moderate expected production increases associated with minor new capacity additions and recovery of some markets lost over the last few years.

Additional growth in the chemical industry is projected to come from manufacturing loads associated with the natural gas industry. The LNG facility at Grassy Point is projected to proceed with gas compressors and require 160 GW.h per year. If electric compressors are used an additional 600 to 800 GW.h per year would be required. The ammonia plant at Kitimat will require 100 GW.h per year.

The poor health in B. C.'s metal mining industry translates into only a modest increase in electricity sales between 1984/85 and 1995/96. Added load will come from bringing presently closed production back to normal, increased copper production at Bethlehem/ Valley Copper requiring roughly 410 GW.h and a new molybdenum mine (Trout Lake) requiring 40 GW.h. This growth will be offset by closures of existing mines as ore is depleted resulting in the total requirements for this sector increasing by only 430 GW.h by 1995/96.

The assessment of the mineral fuels sector indicates that there will be no major new coal mines during the forecast period and that existing mines are unlikely to operate at much higher capacity than at present. Some new load, 50 GW.h, will come from two new small high quality thermal coal mines with close proximity to existing transportation and 150 GW.h will come from a Natural Gas Liquids (NGL) extraction plant.

The "other" category contained in Table 7 includes both other primary and manufacturing industries as well as unspecified load. Other primary industries comprise agriculture, forestry, fishing and non-metal mines, and accounted for 189 GW.h of the 1 753 GW.h load in 1984/85. No major increase for this portion of the load is expected. Other manufacturing industries include food and beverages, non-metallic mineral products (including cement, lime and fiberglass) and miscellaneous manufacturing and are forecast to increase at a rate somewhat less than total GDP. The total load of these three

subsectors was 1 090 GW.h in 1984/85 and is forecast to reach 1 278 GW.h by 1995/96. Another major subsector, petroleum and coal products (largely oil refineries), is projected to decline marginally from the 1984/85 level of 343 GW.h with the closure of one (or more) of the Lower Mainland refineries. The last remaining major subsector, primary metal, is expected to increase from 131 GW.h in 1984/85 to 384 GW.h in 1995/96 with the addition of 230 GW.h for a copper smelter.

A major amount of unspecified load, 680 GW.h, is included for potential sales under Bill 28. A major unnamed project (e.g. Kaiser mini-smelter or Union Carbide polycrystalline silicon) requiring 600 GW.h accounts for most of the load. A start up date of 1988 is anticipated. In addition 400 GW.h of unspecified new load is included in the 1990's.

In addition to the Residential, Commercial and Industrial sectors, B. C. Hydro provides for firm exports and inter-utility transfers as shown in Table 6. These sales are forecast to increase at an average annual rate of 2.9% per annum from 267 GW.h in 1984/85 to 365 GW.h in 1995/96 and are largely to the City of New Westminster. The total sales to the four categories (Residential, Commercial, Industrial and Other) are forecast to grow at 2.5% per year compared to a ten-year historical growth rate of 4.3% per year.

In previous forecasts provision for sales to West Kootenay Power and Light (WKP&L) have been included under provisions of the Kootenay Canal agreement. There is now, however, some question as to whether WKP&L will have any substantial requirements from B. C. Hydro so they have not been included in the 1985 Probable Forecast. Actual sales over the last few years, which have been small, are included in inter-utility transfers. Provision in the 1985 forecast for potential sales is made in the High forecast.

The Seattle City Light load results from the agreement not to raise the Ross dam to avoid flooding the Skagit Valley. As shown in Table 6, inclusion of the Seattle City Light load increases the projected rate of growth for the 1984/85 to 1995/96 period from 2.5% to 2.6% per annum.

The discussion to this point describes the basis of the probable forecast over the next 11 years. Actual electricity sales may vary either above or below this probable forecast as a result of:

(i) a higher or lower intensity of electrical use for the given economic/demographic/price forecasts on which it is based; or

(ii) variations in these economic/demographic/price forecasts.

The likely impacts of these two phenomena on the forecast are discussed in the following sections.

3.3 Intensity of Electrical Use - Probable Low and Probable High Electric Forecasts

Translating the probable economic, demographic, sectoral and energy price forecasts into an electric sales forecast involves a series of judgements with respect to how existing customers may change their electrical use and the timing and actual requirements of new customers. In order to reflect the uncertainty of these judgements, a band is developed around the probable electric forecast as shown in Figure 1. Development of this band is accomplished by varying sales in the various rate categories.

The principal judgements, and thus the uncertainties, inherent in forecasting Residential sales are:

- the electricity requirements of new appliances that may come into use over the forecast period;

- the capture rate for electric heating which historically has varied significantly and often independently of the price relationship between electricity and competing fuel sources; and

- the number of people per household and the type of housing they choose.

Varying these factors within a range considered to be consistent with the probable economic and energy price forecasts results in a variation in Residential sales forecast for 1995/96 of about -580 to +970 GW.h.

The forecast for the General rate category (of which the sales are approximately 70% to the commercial sectors) is influenced primarily by the electrical use per unit of floorspace in commercial and institutional buildings as more efficient lighting and more or less electrical equipment is installed.

General sales could vary by -800 to +1 200 GW.h in 1995/96 as a result of fairly small changes in the use per unit of floorspace in new and retrofitted buildings.

In recent years, the longer term forecast for Transmission Rate sales has turned out too high because of cancellation or deferment of new industrial projects. The recession of the early 1980's also led to much of the existing industrial capacity operating at well below capacity. An added uncertainty in this year's forecast is how successful the domestic marketing programs will be (note, sales in 1995/96 under Bill 28 are shown separately but will eventually become Transmission Rate sales). In particular, the longer term effect on sales through Bill 28 (Incentive Discounts) must be addressed. To arrive at a range around the probable Transmission Rate plus Domestic Marketing forecast, the level of capacity utilization is varied during the 1980's and thereafter the rate of investment in new energy-intensive loads and Bill 28 load is changed.

In the probable low case, it is assumed for 1995/96 that investment in new CTMP facilities is slowed and the load is 600 GW.h less. Also the major project of 600 GW.h assumed under Bill 28 does not proceed. In the probable high case, 800 GW.h is added to allow for electric drive of the compressors in the LNG facility, 750 GW.h is added to represent the addition of two new market CTMP mills, and another major project of 600 GW.h is allowed for under Bill 28 sales.

The Other category is varied in proportion to the sum of Residential, General and Transmission Rate loads. The sales to Seattle City Light are assumed to remain unchanged.

The resulting sensitivity range to the probable forecast is shown in Table 8.

Table 8

SENSITIVITY TO PROBABLE ELECTRIC FORECAST

	Probable Low 1995/96 Sales (GW.h)	Probable 1995/96 Sales (GW.h)	Probable High 1995/96 Sales (GW.h)
Residential	10 835	11 418	12 390
General	12 582	13 384	14 622
Transmission Rate	13 250	13 870	15 420
Domestic Marketing (Bill 28)	500	1 100	1 700
Other	798	841	889
Seattle City Light	318	318	318
Total Sales	38 283	40 931	45 339
Losses and Accruals	5 057	5 309	5 851
Total Gross Requirements	43 340	46 240	51 190
11 Year Growth Rate 1984/85 to 1995/96 (%/yr)	1.7	2.3	3.3

3.4 Effects of changes in Forecast Economic Growth - Low and High Electric Forecasts

The probable low and probable high electric forecasts developed above, and the probable electric forecast discussed prior to that, are based on probable economic growth of 2.5% per annum to 1995 and associated population growth of 1.5% per annum for the same period. The low forecast for economic growth to 1995, is 1.5% per annum with a corresponding population growth rate of 1.0% per annum and the high forecast for economic growth is 3.5% with population at 2.0% per annum.

Estimates of future electricity sales corresponding to the low economic outlook are prepared for each rate category as follows:

Residential - based on the low population growth and lower rates of household formation and appliance requirements to reflect lower income and lower capture rates for electric heat;

General - based mainly on lower real GDP and population growth forecasts, along with the lower floorspace consumption levels;

Transmission Rate - estimated by relating the low GDP to the probable GDP. In the first few years additional adjustments are made to reflect a possible low scenario for utilization of existing industrial capacity; and

Domestic Marketing - estimated by judgementally varying from the low probable forecast.

This approach results in a low total requirements forecast of 40 310 GW.h in 1995/96, 13.0% below the probable.

A similar approach is used on the above categories to derive sales for the high forecast. In addition, for the high projections, an allowance for sales to WKP&L is included amounting to 850 GW.h in 1995/96. The result is gross requirements of 56 040 GW.h in 1995/96, 21% above the probable.

3.5 Tabulations

The following six tables present the electric forecast on a year-to-year basis and details of the basis of each component of the forecast. Table 9 presents the probable forecast, and range of forecasts, for the total B. C. Hydro system; Table 10 presents the details of the residential forecast; Tables 11 and 12 present sales to the Commercial and Industrial customers and the breakdown of their sales to B. C. Hydro's General and Transmission Rate categories; Table 13 presents the electric sales forecast by B. C. Hydro's rate categories; and Table 14 presents the load on the integrated system and a comparison with the 1984 forecast.

Table 9

B. C. HYDRO ELECTRIC GROSS LOAD REQUIREMENTS FORECAST
TOTAL B. C. HYDRO

Fiscal Year	July 1985 Forecast										July 1984 Forecast	
	Low		Range of Probable Forecasts						High		Probable	
			Probable Low		Probable		Probable High					
	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)
1983/84 (Actual)	6 246	32 545	6 246	32 545	6 246	32 545	6 246	32 545	6 246	32 545	6 246	32 545
1984/85 (Actual)	6 226	35 842	6 226	35 842	6 226	35 842	6 226	35 842	6 226	35 842	6 226	35 842
FORECAST												
1985/86	6 360	35 210	6 460	35 900	6 570	36 620	6 650	37 120	6 910	37 920	6 310	35 290
1986/87	6 470	36 140	6 640	37 190	6 780	38 060	6 920	38 920	7 220	39 990	6 720	36 780
1987/88	6 410	35 750	6 610	36 970	6 770	37 970	6 970	39 160	7 320	40 410	6 830	37 420
1988/89	6 470	36 060	6 690	37 450	6 970	39 160	7 240	40 830	7 640	42 310	7 020	38 570
1989/90	6 530	36 430	6 830	38 220	7 110	40 000	7 440	41 960	7 900	43 720	7 300	40 290
1990/91	6 640	37 080	7 030	39 430	7 320	41 240	7 760	43 890	8 290	46 060	7 510	41 360
1991/92	6 830	38 240	7 210	40 550	7 560	42 670	8 080	45 790	8 730	48 550	7 730	42 660
1992/93	6 970	39 120	7 380	41 560	7 780	43 970	8 370	47 470	8 810	50 650	7 890	43 550
1993/94	7 000	39 270	7 480	42 110	7 870	44 410	8 580	48 650	9 380	52 240	8 030	44 240
1994/95	7 100	39 890	7 600	42 820	8 050	45 460	8 820	50 050	9 700	54 150	8 170	45 040
1995/96	7 170	41 310	7 680	43 270	8 190	46 240	9 020	51 180	10 050	56 040	8 410	46 500
Avg Ann Growth: % 11 Yrs: 84/85-95/96	1.3	1.1	1.9	1.7	2.5	2.3	3.4	3.3	4.4	4.1	2.8	2.4

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Table 10

RESIDENTIAL ELECTRIC SALES FORECAST
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	Average Residential[a] Accounts (000)	Percent[b] Electric Heating (%)	Annual Average Use Per Account:[c] Non Electric Heating (kW.h)	Electric Heating (kW.h)	All Accounts (kW.h)	Total Sales (GW.h)
1983/84 (Actual)	978.9	16.4	8 151	14 559	9 199	9 005
1984/85 (Actual)	998.8	17.0	8 255	16 103	9 589	9 577
Avg. Ann. Growth: % 10 Years: 74/75 - 84/85	3.4	-	1.3	-1.7	1.9	5.4
FORECAST						
1985/86	1 014.8	17.7	8 167	15 198	9 414	9 553
1986/87	1 035.3	18.5	8 143	15 130	9 433	9 765
1987/88	1 054.0	19.0	8 095	14 951	9 400	9 908
1988/89	1 071.9	19.4	8 126	14 904	9 444	10 122
1989/90	1 093.0	19.8	8 138	14 805	9 460	10 339
1990/91	1 116.6	20.2	8 173	14 722	9 496	10 605
1991/92	1 141.9	20.6	8 172	14 574	9 489	10 836
1992/93	1 166.0	20.9	8 149	14 414	9 460	11 029
1993/94	1 189.6	21.2	8 091	14 231	9 396	11 177
1994/95	1 213.2	21.6	8 016	14 036	9 313	11 299
1995/96	1 236.8	21.8	7 943	13 843	9 232	11 418
Avg. Ann. Growth: % 11 Years: 84/85 - 95/96	2.0	-	-0.3	-1.4	-0.3	1.6

[a] Developed from the population forecast by applying headship rates and factors to distribute households by type of dwelling. In 1984/85, the B. C. Hydro household dwelling mix was 64% houses, 4% row houses, 23% apartments, 5% mobile, and 4% seasonal. In 1995/96, the mix is forecast to be 63%, 5%, 24%, 5% and 3% respectively.

[b] The relative costs of gas and electric space heating have been calculated historically based on average residential rates. From the historic relation between relative price and actual capture rates, the 1985/86 capture rates for electric space heating have been estimated to be 16% for single family dwellings, 60% for row housing and 55% for apartments (excluding Vancouver Island). Although gas prices are forecast to increase slightly in relation to electricity, gas furnace efficiencies are projected to improve and, as a result, the capture rates for electric heating are projected to remain relatively constant over the forecast period. The overall average, with gas becoming available on Vancouver Island in 1987/88, is 41% between 1984/85 and 1995/96.

[c] The electricity use for non-electrically heated households is a function of the projections of the numbers of appliances per household and the use per appliance. During the forecast period households are projected to have greater numbers of appliances but because they are more efficient, the use per household does not increase. The decline in use for electrically heated households results from a greater proportion of row houses and apartments, as well as from higher insulation levels in new dwellings and other conservation efforts.

TABLE 11

COMMERCIAL ELECTRIC SALES FORECAST
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	By Standard Industrial Classification (SIC)							By Rate Category		
	Transportation Communication & Other Utilities[a] (GW.h)	Wholesale & Retail Trade[b] (GW.h)	Finance, Insurance & Real Estate[c] (GW.h)	Community, Business & Pers. Serv.[d] (GW.h)	Public Admin. & Defence[e] (GW.h)	Unclassified[f] (GW.h)	Total (GW.h)	General (GW.h)	Trans Rate (GW.h)	Other[g] (GW.h)
1984/85 (Actual)	1 217	1 800	1 463	2 705	600	163	7 970	7 261	334	375
FORECAST										
1985/86	1 153	2 030	1 542	2 977	583	148	8 432	7 705	345	382
1986/87	1 190	2 061	1 582	3 123	609	154	8 719	7 969	360	390
1987/88	1 227	2 081	1 608	3 104	610	160	8 789	8 016	375	398
1988/89	1 257	2 090	1 629	3 155	617	164	8 912	8 119	385	408
1989/90	1 305	2 125	1 664	3 222	638	172	9 126	8 313	395	418
1990/91	1 356	2 171	1 706	3 305	655	180	9 372	8 527	420	425
1991/92	1 405	2 221	1 751	3 388	673	187	9 625	8 770	420	435
1992/93	1 455	2 270	1 794	3 478	693	195	9 885	9 015	425	445
1993/94	1 507	2 318	1 837	3 571	717	203	10 152	9 272	425	455
1994/95	1 562	2 368	1 881	3 668	737	211	10 426	9 526	435	465
1995/96	1 618	2 420	1 925	3 769	757	219	10 708	9 787	445	476
Avg Ann Growth: % 11 Yrs: 84/85-95/96	2.6	2.7	2.5	3.1	2.1	2.7	2.7	2.8	2.6	2.2

[a] Growth in this category reflects the anticipated build up of operations at Westshore and Ridley coal terminals as well as at the Ridley Grain Terminal. Trans Mountain Pipeline at Kamloops is increasing its capacity and an allowance is included for the pumping requirements of the Vancouver Island Gas Pipeline project. The base load is expected to grow at a level slightly below that of the overall GDP forecast.

[b] The wholesale and retail trade forecast is based on projections of increased floorspace as developed from GDP and retail sales estimates, combined with anticipated reductions in the energy use per square meter that are expected as a result of conservation improvements. Generally trade is expected to out perform overall economic activity in terms of annual growth.

[c] Most of the sales in this category are linked to projections of increased floorspace requirements and the corresponding reductions in energy use per square meter of floorspace. Particularly in the office space component it is anticipated that the electricity use will decline slightly over time.

[d] Two major components of this category are health and education which are projected based on population estimates, and are estimated to grow at less than 1% per annum. The other major components are food and accommodation and they are expected to continue to expand rapidly as tourism plays an important role in the expansion of the B. C. economy.

[e] The government sector is expected to continue to dampen its level of growth resulting in modest increases in sales.

[f] Unclassified includes the portion of non-residential energy sales within B. C. Hydro that has not yet been coded. It has been assumed that the growth of the services in this sector will be the same as the average growth of all the other commercial sectors.

[g] The "Other" rate category includes Irrigation, Street Lighting, and B. C. Hydro Use.

Table 12

INDUSTRIAL ELECTRIC SALES FORECAST
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	By Standard Industrial Classification (SIC)									By Rate Category					
	Primary Industries			Manufacturing				Construction[h]							
	Metal Mines[a] (GW.h)	Mineral Fuels[b] (GW.h)	Other[c] (GW.h)	Wood[d] (GW.h)	Paper & Allied[e] (GW.h)	Chemical & Chem. Products[f] (GW.h)	Other[g] (GW.h)	(GW.h)	Total (GW.h)	General (GW.h)	Trans Rate (GW.h)	Blk Rec (Rate 1843) (GW.h)	Off Off (Rate 1844) (GW.h)	Bill 31 (GW.h)	Bill 28 (GW.h)
1983/84 (Actual)	2 332	460	162	1 699	4 688	1 055	1 456	179	12 031	3 034	8 307	190	0	0	0
1984/85 (Actual)	2 204	632	189	1 751	5 849	1 330	1 564	148	13 667	3 079	10 142	387	59	0	0
FORECAST															
1985/86	2 080	680	194	1 720	6 235	1 340	1 584	151	13 984	3 044	10 005	100	650	155	30
1986/87	2 282	786	199	1 680	6 539	1 371	1 576	154	14 588	2 988	10 540	0	650	330	80
1987/88	2 388	816	204	1 650	5 942	1 427	1 690	156	14 273	2 943	10 785	0	0	330	215
1988/89	2 385	827	209	1 700	6 219	1 463	2 044	157	15 004	3 019	10 975	0	0	220	790
1989/90	2 372	827	215	1 730	6 302	1 514	2 183	161	15 303	3 083	11 220	0	0	0	1 000
1990/91	2 634	848	220	1 772	6 305	1 635	2 307	167	15 887	3 157	11 620	0	0	0	1 100
1991/92	2 886	848	225	1 859	6 643	1 707	2 335	170	16 672	3 297	12 275	0	0	0	1 100
1992/93	3 048	878	231	1 945	6 921	1 777	2 392	172	17 364	3 404	12 860	0	0	0	1 100
1993/94	2 940	879	237	1 980	6 924	1 818	2 464	175	17 317	3 477	12 740	0	0	0	1 100
1994/95	2 942	884	243	1 990	7 103	1 860	2 642	179	17 843	3 533	13 210	0	0	0	1 100
1995/96	2 634	885	248	2 000	7 231	1 882	3 058	184	18 122	3 597	13 425	0	0	0	1 100
Avg Ann Growth: % per Yrs: 1985-1995/96	1.6	3.1	2.5	1.2	1.9	3.2	6.3	2.0	2.6	1.4	2.6	-	-	-	-

[a] The increase of 430 GW.h in 1995/96 over 1984/85 is largely a result of 290 GW.h for bringing presently closed mines back into production (Highmont, Endako and Goldstream), 410 GW.h for increased production at Bethlehem/Valley Copper, 40 GW.h for Trout Lake a new molybdenum mine, 50 GW.h for miscellaneous load additions at existing mines, 360 GW.h decrease as existing mines begin to close in the 1990's because of ore depletion (Afton, Brenda and Equity).

[b] The increase of 250 GW.h in 1995/96 over 1984/85 is largely a result of 50 GW.h for two new high quality thermal coal mines located close to transportation facilities (Quinsam and Telkwa), 30 GW.h for Byron Creek projected to come on line in 1986, 150 GW.h for a Natural Gas Liquids (NGL) extraction facility at Taylor coming on line in 1985. No major increase in production is expected in the existing mines and considerable excess coking coal capacity is projected to still exist in 1995/96.

[c] The remaining Primary Industries consist of Agriculture, Forestry, Fishing, Other Mines (than metal and coal), Quarries and Sand Pits, Incidental Services. Moderate growth is expected.

[d] The 250 GW.h increase in 1995/96 over 1984/85 is a result of 150 GW.h for increased production and 100 GW.h for new wood drying load. The 150 GW.h for increased production comes from a moderate increase in lumber production, a substantial increase in production of other panel products (wafer board in particular) and a decrease in veneer and plywood production.

[e] The 1 380 GW.h increase in purchased electricity in 1995/96 over 1984/85 is accompanied by a projected increase of 500 GW.h in self and co-generation. The total increase of 1 880 GW.h is projected to come largely from 380 GW.h for increased production from existing capacity, 450 GW.h associated with replacement of stone groundwood (SGWD) with thermo-mechanical pulping (TMP) and capacity expansions, 450 GW.h for a new CTMP plus fine paper mill, 600 GW.h for new production of CTMP and paperboard at existing mills. The increases in electricity requirements are not due to a large increase in pulp capacity projections but rather to the fact that mechanical pulping, which most new pulp capacity is projected to be, is approximately three times as electric intensive as chemical pulping. Also, it is not economic or practical to install co-generation with mechanical pulping.

[f] The 670 GW.h increase in 1995/96 over 1984/85 is largely from projected new load associated with natural gas industry and includes 160 GW.h for the projected liquified natural gas (LNG) facility at Grassy Point (gas compressors are assumed to be used), 100 GW.h for an ammonia plant at Kitimat which will start production in 1986. The remaining 290 GW.h is largely for increased production (from existing capacity) from the chemical plants serving mainly the pulp and paper industry with some recovery of lost markets and development of new ones assumed.

[g] The 1 500 GW.h increase in 1995/96 over 1984/85 is largely for non-specified new load, an allowance under Bill 28 for 680 GW.h largely for one major customer coming on line in 1988 and 400 GW.h for miscellaneous near the end of the period. The existing other manufacturing consists mainly of food and beverage - moderate growth projected, primary metal - a copper smelter of 230 GW.h allowed for in 1995, non-metallic mineral products - cement and fibreglas mainly with only minimal growth, petroleum and coal products - refineries are the main load and one Lower Mainland refinery is expected to close thus causing negative growth.

[h] Construction is not expected to grow significantly.

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Table 13

B. C. HYDRO HISTORICAL AND PROBABLE ELECTRIC FORECAST BY SALES CATEGORIES
(Billed Basis, No Adjustment For Accrual)

Fiscal Year	Residential (GW.h)	General (GW.h)	Trans Rate (GW.h)	Other[a] (GW.h)	Domestic Marketing Programs[d] (GW.h)	Sub-Total (GW.h)	Seattle City Light (GW.h)	Total Billed Sales (GW.h)	Losses & Accruals (GW.h)	Total Gross Requirements (GW.h)	Peak (MW)
HISTORICAL											
1974/75	5 685	6 685	7 714[b]	495		20 579		20 579	2 815	23 394	3 957
1975/76	6 258	7 062	6 808[b]	532		20 660		20 660	2 878	23 538	4 232
1976/77	6 625	7 592	8 166	541		22 924		22 924	3 072	25 996	4 421
1977/78	7 051	8 073	8 479	561		24 164		24 164	3 372	27 536	4 800
1978/79	7 492	8 512	9 133	583		25 720		25 720	3 628	29 348	5 122
1979/80	7 727	8 949	9 217	625		26 518		26 518	3 455	29 973	5 231
1980/81	8 042	9 344	9 597[b]	581		27 564		27 564	3 594	31 158	5 511
1981/82	8 640	9 706	9 339[b]	623		28 308		28 308	4 051	32 359	5 939
1982/83	8 821	9 704	9 046[b]	635		28 206		28 206	3 307	31 513	5 537
1983/84	9 005	9 829	9 074[b]	622	190	28 620		28 720	3 825	32 545	6 246
1984/85	9 577	10 340	10 476	642	446	31 481		31 481	4 361	35 842	6 226
Avg. Ann. Growth: % 10 Years: 74/75 - 84/85	4.9	4.0	2.8	2.4	-	3.9		3.9	-	4.0	4.2
FORECAST											
1985/86	9 553	10 749	10 350	647	935	32 234	136	32 370	4 250	36 620	6 570
1986/87	9 765	10 957	10 900	667	1 060	33 349	318	33 667	4 389	38 060	6 780
1987/88	9 908	10 959	11 160	684	545	33 256	318	33 574	4 393	37 970	6 770
1988/89	10 122	11 138	11 360	703	1 010	34 333	318	34 651	4 513	39 160	6 970
1989/90	10 339	11 396	11 615	722	1 000	35 072	318	35 390	4 611	40 000	7 110
1990/91	10 605	11 694	12 040	738	1 100	36 177	318	36 495	4 746	41 240	7 320
1991/92	10 836	12 067	12 695	758	1 100	37 456	318	37 774	4 899	42 670	7 560
1992/93	11 029	12 419	13 285	778	1 100	38 611	318	38 929	5 037	43 970	7 780
1993/94	11 177	12 749	13 165	798	1 100	38 989	318	39 307	5 106	44 410	7 870
1994/95	11 299	13 059	13 645	819	1 100	39 922	318	40 240	5 217	45 460	8 050
1995/96	11 418	13 384	13 870	841	1 100	40 613	318	40 931	5 309	46 240	8 190
Avg. Ann. Growth: % 11 Years: 84/85 - 95/96	1.6	2.4	2.6	2.5	8.6	2.1	-	2.4	1.8	2.3	2.5

[a] "Other" includes Irrigation, Street Lighting, B. C. Hydro Use, Inter-Utility (incl. WKP&L actual sales) and Out of Province Firm.

[b] There were forestry industry strikes/lockouts in 1975/76, 1981/82 and 1983/84 causing reductions in Transmission Rate sales.

[c] The 1995/96 electricity requirements in this forecast are virtually unchanged from the July 1984 Probable Forecast.

[d] Domestic Marketing Programs encompass sales under:

(i) Block Recovery (Rate 1843) - this rate to end 31 July 1985.
(ii) Off Oil or Turbine Turndown (Rate 1844) - this rate to end 31 March 1987 and no extension is assumed. Sales are to Pulp and Paper customers.
(iii) Bill 31 (Critical Industries Act) - negotiated by customer, Bell and Brenda are the only two loads assumed.
(iv) Bill 28 (Incentive Discount Act) - essentially this replaces Rate 1843 sales but rates will be negotiated on an individual customer basis. Refer to Table 12 for a sales breakdown.

Table 14

B. C. HYDRO ELECTRIC GROSS LOAD REQUIREMENTS FORECAST
INTEGRATED SYSTEM

Fiscal Year	July 1985 Forecast										July 1984 Forecast	
	Low		Range of Probable Forecasts						High		Probable	
			Probable Low		Probable		Probable High					
	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)	Peak (MW)	Energy (GW.h)
1983/84 (Actual)	6 215	32 387	6 215	32 387	6 215	32 387	6 215	32 387	6 215	32 387	6 215	32 387
1984/85 (Actual)	6 193	35 680	6 193	35 680	6 193	35 680	6 193	35 680	6 193	35 680	6 193	35 680
FORECAST												
1985/86	6 320	35 040	6 420	35 730	6 530	36 450	6 610	36 950	6 870	37 750	6 270	35 115
1986/87	6 430	35 970	6 600	37 010	6 740	37 880	6 880	38 750	7 180	39 820	6 680	36 600
1987/88	6 370	35 570	6 570	36 790	6 730	37 780	6 930	38 970	7 280	40 220	6 790	37 235
1988/89	6 430	35 870	6 650	37 260	6 930	38 970	7 200	40 640	7 600	42 120	6 980	38 380
1989/90	6 490	36 240	6 790	38 030	7 070	39 810	7 400	41 770	7 860	43 520	7 260	40 095
1990/91	6 600	36 880	6 990	39 230	7 280	41 040	7 720	43 690	8 250	45 860	7 470	41 180
1991/92	6 790	38 030	7 170	40 350	7 520	42 470	8 040	45 580	8 690	48 340	7 690	42 455
1992/93	6 920	38 910	7 330	41 340	7 730	43 750	8 320	47 250	8 760	50 430	7 840	43 340
1993/94	6 950	39 050	7 430	41 880	7 820	44 190	8 530	48 420	9 330	52 020	7 980	44 025
1994/95	7 050	39 660	7 550	42 590	8 000	45 230	8 770	49 820	9 650	53 920	8 120	44 820
1995/96	7 120	40 070	7 630	43 030	8 140	46 000	8 970	50 950	10 000	55 800	8 360	46 200
Avg Ann Growth: % 11 Yrs: 84/85-95/96	1.3	1.1	1.9	1.7	2.5	2.3	3.4	3.3	4.5	4.1	2.8	2.4

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GAS FORECASTS

4.0 GAS SERVICE

4.1 Basis of Forecasts

The 1985 natural gas load forecast generally follows the methodology of the electric load forecast. The integration of forecast methodologies commenced in 1983 with both using a top down/end use forecasting approach. Disaggregation of natural gas load data into Standard Industrial Classification (SIC) codes has allowed more detailed load analysis than was possible in previous years. Large natural gas loads subject to potentially major changes have been assessed individually.

4.2 Probable Forecast

The principal components of the 1985 probable natural gas forecast are shown in Table 15. The forecast is presented in terms of SIC code groups and as well the commercial and industrial loads are regrouped into the general and interruptible rate categories.

Table 15

B. C. HYDRO NATURAL GAS SALES - 1995/96

Category	Normal 1984/85 Sales (TJ)	Increase in Sales 1984/85 to 1995/96 (TJ)	Normal 1995/96 Sales (TJ)	Average Growth 1984/85 to 1995/96 (%/yr)
Residential	38 865	1 266	40 131	0.3
Commercial	30 880	10 098	40 978	2.6
Industrial	23 529	(1 792)	21 737	(0.7)
NGV	185	6 776	6 961	39.1
Other	191	40	231	1.7
Total Sales	93 650	16 388	110 038	1.5
of which:				
General	34 742	11 979	46 721	2.7
Interruptible	19 667	(3 673)	15 994	(1.9)

The forecast growth rate for residential sales is 0.3% per annum compared to last year's forecast of 1.5%. This reduction is due largely to a lower population and household growth forecast for the Lower Mainland. Accounts are expected to grow at 2% per annum and most of this is attributable to conversions from oil heating to natural gas which is estimated to continue until about 1990. Use rates are derived from assessing the impact of conservation, housing mix and new furnace efficiency. The details of the residential forecast and the annual data to 1995/96 are presented in Table 17.

Projections for the commercial and industrial sectors indicate 11 year growth rates of 2.6% and -0.7% per annum respectively. This compares with last year's forecast of 1.6% and 0.9%.

The major sales components of the group are community and business activities, which includes education and health services; and apartments and row housing which relates to centrally heated housing. Compared to last year sales in the first of these categories is up while in the second category sales are unchanged.

Details of the commercial natural gas sales forecast are presented in Table 18.

The industrial sales group includes several manufacturing activities, agriculture and a small mining component. Load growth fluctuates by category (as shown in Table 19) but the major changes in load result from:

- fuel switching at cement manufacturing facilities which causes substantial loss of gas load;

- lower capacity utilization and natural gas consumption at crude oil refineries due to transfers of refined petroleum products from Alberta refineries through Trans Mountain Pipeline; and

- decline in natural gas sales to the paper and allied products category due to the offset of natural gas by steam generation from the GVRD garbage burning facilities.

The impact of the load reductions at cement and refinery facilities combined with the gas displacement in paper and allied products causes a decline in total load growth for the industrial sector during the period to 1995/96.

Natural Gas for Vehicles (NGV) load has the potential to grow at widely different rates. Three cases for NGV load growth have been prepared. The probable case shown in Table 15 relies on a successful marketing effort in the Lower Mainland. The forecast load growth for NGV includes capturing most of the Metro Vancouver taxi fleets, 40 public service stations, and penetration of B. C. Ferries and diesel truck fleet markets.

Other natural gas sales are to B. C. Hydro's own facilities and seasonal loads. Most of the load growth occurs in the seasonal component as B. C. Hydro use remains static.

Once the sales forecast has been completed by SIC grouping, further analysis is undertaken to allocate the commercial and industrial sales into 'interruptible' and 'general' rate categories.

Sales in the interruptible rate category are estimated on the basis of historical trends and expected future developments, including reduced load at cement plants, refineries and the GVRD facility where garbage will be used as fuel to displace natural gas. Since the early 1970's, interruptible sales have fluctuated significantly. They reached a peak in 1979/80 and have been declining since then. With the loss of load estimated in this forecast, future interruptible sales will continue to decline until after 1991/92 when a slow upturn starts as fuel switching is complete.

Sales in the general rate category are calculated as the residual of the sum of commercial and industrial sales less interruptible sales. Total commercial and industrial sales growth is modest at 1.3% per annum while growth in general sales is higher at 2.7%. This is due to the decline in interruptible sales.

As shown in Table 20, total sales of natural gas in the Lower Mainland increase at 1.5% per year to 1995/96. This appears lower than the 1984 load forecast growth rate of 1.7% per year. However, the reduction is essentially the result of the new 1984/85 base, and sales for 1995/96 are almost identical to those projected last year.

Table 16

B. C. HYDRO NATURAL GAS AND L.P. GAS SALES FORECAST
LOWER MAINLAND - VANCOUVER ISLAND

(Lower Mainland Forecast Includes NGV)

(TJ)[a, b]

	July 1985 Forecast						July 1984 Forecast	
	Low		Probable		High		Probable	
	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[e]	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[e]	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[e]	Lower Mainland Natural Gas	Vancouver Island L.P. Gas[e]
1984/85 (Actual)	99 724	367	99 724	367	99 724	367		367[d]
(Actual Normalized)[c]	93 650		93 650		93 650		93 650[d]	
FORECAST								
1985/86	94 228	401	95 336	401	96 357	401	94 573	401
1986/87	93 822	401	96 725	401	97 394	401	95 198	401
1987/88	93 634	401	97 963	401	99 155	401	97 202	401
1988/89	93 953	401	99 222	401	101 332	401	99 290	401
1989/90	94 175	401	100 667	401	103 488	401	101 135	401
1990/91	95 570	401	102 126	401	106 309	401	102 592	401
1991/92	96 192	401	103 740	401	108 780	401	104 006	401
1992/93	97 213	401	105 264	401	111 820	401	105 422	401
1993/94	98 502	401	106 906	401	114 543	401	106 978	401
1994/95	99 587	401	108 408	401	117 168	401	108 557	401
1995/96	100 968	401	110 038	401	120 111	401	110 352	401
Avg Ann Growth: % (Normalized Base) 11 Yrs: 84/85-95/96	0.7	-	1.5	-	2.3	-	1.5	-

NOTES:

[a] TJ = 10^{12} Joules.

[b] Imperial to metric conversion for information: 1 BTU = 1 054.6 Joules.

[c] Normalized for weather and normal 30 day curtailment of interruptible sales.

[d] The 1984 projection for fiscal year 1984/85 was 93 284 TJ for the Lower Mainland and 401 TJ for Vancouver Island.

[e] The load forecast for Vancouver Island assumes that no underwater pipeline will be built between it and the Lower Mainland.

Table 17

RESIDENTIAL NATURAL GAS SALES FORECAST
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	Residential Average Accounts[a,b]			Residential Sales		
	With Heat[b]	Without Heat	Total	With Heat	Without Heat	Total
1983/84 (Actual)	297 338	9 453	306 791	36 806	596	37 402
1984/85 (Actual)	306 141	9 180	315 321	38 157	708	38 865
FORECAST						
1985/86	316 750	8 825	325 575	38 540	702	39 242
1986/87	325 800	8 515	334 315	38 800	699	39 499
1987/88	333 900	8 205	342 105	38 940	693	39 633
1988/89	341 400	7 895	349 295	39 050	685	39 735
1989/90	348 650	7 585	356 235	39 190	675	39 865
1990/91	355 850	7 300	363 150	39 340	665	40 005
1991/92	362 500	7 040	369 540	39 450	650	40 100
1992/93	368 200	6 780	374 980	39 480	634	40 114
1993/94	373 550	6 520	380 070	39 470	617	40 087
1994/95	378 950	6 260	385 210	39 490	598	40 088
1995/96	384 350	6 025	390 375	39 550	581	40 131
Avg Ann Growth: % 11 Yrs: 84/85-95/96	2.1	(3.8)	2.0	0.3	(1.8)	0.3

[a] Developed from provincial population projection, Lower Mainland share of population, headship rates, distribution of housing by type of dwelling, identification of gas service area.

[b] The capture rate varies by type of dwelling. The 1984/85 natural gas capture rates for new dwellings in the natural gas service area of the Lower Mainland are as follows: single 94.8%, row 64.3% and apartment 34.2%. In 1995/96 the capture rates are single 96.4%, row 48.3% and apartment 57.3%.

Table 18

COMMERCIAL NATURAL GAS SALES FORECAST
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	By Standard Industrial Classification (SIC)							
	Transportation Communication & Other Utilities	Wholesale & Retail Trade	Finance, Insurance & Real Estate	Community Business & Pers. Serv.[a]	Public Admin. & Defence	Unclassified[b]	Apartments & Row Housing[c]	Total
1983/84 (Actual)	2 088	2 578	3 112	10 012	901	2 893	8 783	30 367
1984/85 (Actual)	2 052	2 677	2 841	10 367	924	2 933	9 086	30 880
FORECAST								
1985/86	2 122	2 762	2 933	11 400	928	3 005	9 208	32 358
1986/87	2 196	2 947	3 119	13 187	935	3 185	9 421	34 990
1987/88	2 280	3 139	3 308	14 040	944	3 366	9 633	36 710
1988/89	2 358	3 170	3 352	14 124	950	3 394	9 712	37 060
1989/90	2 443	3 315	3 495	14 323	958	3 521	9 876	37 931
1990/91	2 526	3 361	3 548	14 387	959	3 558	9 952	38 291
1991/92	2 613	3 512	3 701	14 639	967	3 690	10 126	39 248
1992/93	2 704	3 566	3 757	14 717	979	3 736	10 202	39 661
1993/94	2 801	3 619	3 818	14 844	988	3 773	10 285	40 128
1994/95	2 893	3 684	3 879	14 914	998	3 810	10 363	40 541
1995/96	2 997	3 728	3 945	14 997	1 004	3 862	10 445	40 978
Avg Ann Growth: % 11 Yrs: 84/85-95/96	3.5	3.1	3.0	3.4	0.8	2.5	1.3	2.6

[a] Includes several categories (with 1984/85 classified natural gas load in brackets): education (3 316 TJ), health and welfare (2 439 TJ), accommodation and food (2 201 TJ), amusement and recreation (737 TJ), personal services (658 TJ) and others (1 016 TJ).

[b] Part of the general load is not classified by SIC category. It is increased at the average rate of increase of the classified loads.

[c] A total of 129 660 apartments and 1 179 row housing units are centrally heated and are classified as commercial load. The number of apartments and row houses are determined in the demographic model which includes population and housing components. The average unit use rate is determined by examining several factors including energy price, conservation and furnace efficiency.

Table 19

INDUSTRIAL NATURAL GAS SALES FORECAST
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	By Standard Industrial Classification (SIC) By SIC Category											
	Constr-uction	Non-Metal Minerals[a]	Petro. & Coal[a]	Food & Beverage	Paper & Allied[c]	Wood Manuf.	Chemical & Chem. Prod.	Metal Fabric.	Prim. Metal	Agric.	Other[b]	Total
1983/84 (Actual)	786	4 498	4 110	3 033	2 636	2 082	1 605	995	439	1 380	870	22 434
1984/85 (Actual)	693	5 367	3 651	2 971	3 395	1 918	1 320	998	709	1 469	1 038	23 529
FORECAST												
1984/85	702	5 068	3 430	3 004	3 429	1 937	1 335	1 014	721	1 490	1 053	23 183
1985/86	713	3 545	2 962	3 037	3 470	1 935	1 353	1 031	733	1 513	1 068	21 360
1986/87	722	3 283	2 481	3 058	2 994	1 925	1 367	1 047	744	1 536	1 084	20 241
1987/88	732	3 369	2 508	3 093	2 972	1 953	1 387	1 064	756	1 559	1 099	20 492
1988/89	744	3 445	2 529	3 126	2 537	1 988	1 405	1 084	771	1 585	1 116	20 330
1989/90	760	3 540	2 559	3 162	2 491	2 044	1 426	1 112	791	1 606	1 132	20 623
1990/91	772	3 643	2 595	3 205	1 966	2 098	1 449	1 133	806	1 630	1 153	20 450
1991/92	783	3 738	2 624	3 249	1 931	2 143	1 470	1 153	820	1 657	1 166	20 734
1992/93	796	3 849	2 663	3 300	1 952	2 178	1 494	1 176	836	1 689	1 185	21 118
1993/94	810	3 932	2 682	3 349	1 933	2 186	1 510	1 201	854	1 714	1 208	21 379
1994/95	827	4 052	2 722	3 375	1 953	2 205	1 535	1 229	874	1 727	1 238	21 737
Avg Ann Growth: % 11 Yrs: 84/85-95/96	1.6	(2.5)	(2.6)	1.2	(4.9)	1.3	1.4	1.9	1.9	1.5	1.6	(0.7)

[a] Non-metal mineral load is largely associated with two cement plants. Drop in load is due to fuel switching at these plants. Petroleum and coal load is largely associated with refineries. Drop in load is due to lower capacity utilization as refined petroleum products are shipped from more efficient refineries in Alberta via Trans Mountain Pipeline.

[b] Other is mining (7.1 TJ) and miscellaneous manufacturing. Mining load is increased by H. N. Halvorson estimates of sand and gravel production. Miscellaneous manufacturing load is increased by manufacturing GDP.

[c] It is assumed that the steam generated by all 3 phases of the GVRD's garbage burning facilities will be sold to the Paper & Allied classification.

Table 20

B. C. HYDRO HISTORICAL AND PROBABLE LOWER MAINLAND NATURAL GAS FORECAST
BY SALES CATEGORIES
(Billed Basis, No Adjustment For Accrual)
(TJ)

Fiscal Year	Residential	Commercial	Industrial	Natural Gas For Vehicles[a]	Other	Total Sales	General With Heat	General Without Heat	Interruptible[b]
1983/84 (Actual)[c,d]	37 402	30 367	22 434	134	196	90 533	30 952	2 726	19 123
1984/85 (Actual)[c,d]	38 865	30 880	23 529	185	191	93 650	31 776	2 966	19 667
FORECAST									
1985/86	39 242	32 358	23 183	357	196	95 336	33 106	2 996	19 439
1986/87	39 499	34 990	21 360	676	200	96 725	35 613	3 028	17 709
1987/88	39 633	36 710	20 241	1 176	203	97 963	37 283	3 044	16 624
1988/89	39 735	37 060	20 492	1 728	207	99 222	37 739	3 075	16 738
1989/90	39 865	37 931	20 330	2 331	210	100 667	38 819	3 111	16 331
1990/91	40 005	38 291	20 623	2 993	214	102 126	39 210	3 146	16 558
1991/92	40 100	39 248	20 450	3 725	217	103 740	40 587	3 181	15 930
1992/93	40 114	39 661	20 734	4 534	221	105 264	41 234	3 215	15 946
1993/94	40 087	40 128	21 118	5 349	224	106 906	42 022	3 252	15 962
1994/95	40 088	40 541	21 379	6 172	228	108 408	42 649	3 293	15 978
1995/96	40 131	40 978	21 737	6 961	231	110 038	43 382	3 339	15 994
Avg Ann Growth: % 11 Yrs: 84/85-95/96	0.3	2.6	(0.7)	39.1	1.7	1.5	2.9	1.1	(1.9)

[a] In 1983/84, 100 TJ was sold on an interruptible basis; in 1984/85, 121 TJ.

[b] Normal 30 day curtailment of interruptible sales.

[c] Disaggregation of general and interruptible loads to commercial and industrial categories has not yet been extended historically beyond 1983/84.

[d] All historical loads have been normalized for weather.

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